

nomenon lasted 30 minutes. Barnegat, N. J., 18th, 4 miles below station, moving southeastward across the bay.

High Tides.—Indianola, 1st, 8th; Norfolk, 5th; New London, 26th; New Haven, 29th.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left-hand side of chart No. III. Owing to the breakage of instrument, observations at Charleston, S. C., wanting from the 1st to 7th.

ATMOSPHERIC ELECTRICITY.

Thunder Storms.—In the various districts they were reported as follows: New England, 3d, 17th, 18th; Middle Atlantic states, 1st, 17th, 18th, 30th, 31st; South Atlantic states, 17th, 18th, 19th, 30th, 31st; East Gulf states, 1st, 16th, 18th, 19th, 23d, 29th, 30th; West Gulf states, 4th, 11th, 15th, 17th, 23d, 26th, 27th, 29th; Rio Grande valley, 22d, 23d, 26th; Ohio valley and Tennessee, 2d, 3d, 4th, 8th, 9th, 13th, 15th to 19th, 28th to 30th; Lower Lake region, 2d, 8th, 15th, 17th, 27th; Upper Lake region, 1st, 6th to 8th, 12th, 14th, 15th, 17th, 28th, 29th; extreme Northwest, 10th, 11th; Upper Mississippi valley, 3d, 4th, 7th, 8th, 11th, 13th to 16th, 19th, 21st, 27th, 28th; Missouri valley, 1st to 4th, 8th to 18th, 21st to 23d, 27th to 30th; Northern Slope, 10th, 16th; Middle Slope, 8th, 11th, 12th, 14th to 16th, 21st, 22d, 26th, 27th; Southern Slope, 3d, 12th, 13th, 16th to 18th, 22d, 26th; Southern Plateau, 3d to 8th, 12th to 15th, 18th, 21st, 23d, 24th; Middle Plateau, 10th, 25th; Northern Plateau, 6th.

Auroras.—The most general display was that of the night of the 16th and 17th, which was observed from Sydney, N. S., westward to Ft. Sisseton, Dak., and as far south as Freehold, N. J., 17 intervening stations reporting. The display was not a very remarkable one, many of the features usually observed being absent. The display of the 18th was exclusively observed in the Lake region being reported by the following stations: Marquette, 18th, from 10.10 to 11.15 p. m.; Mission House, Wis., 18th, from 9 to 11 p. m., faintly illumined arch, with dark cloud underneath; Alpena, Mich., 18th, 9.10 p. m., diffuse light without streamers; Toronto, 18th. Other displays were reported as follows: Charlottetown, P. E. I., 20th, 21st, 27th. Fredericton, N. B., 7th, 19th, 27th. Dexter, Me., 19th, faint. Mt. Washington, 19th, from 11.22 p. m., to early morning of 20th, faint light. Burlington, Vt., 19th, from 11 to 11.45 p. m., faint; 20th, 11 to 11.30 p. m., faint; 26th, 11 to 11.40 p. m., faint; 27th, 11 to 11.45 p. m. A noteworthy feature of the display of the 27th was its nearness to the horizon; the dark segment was about 2° above the horizon; dancers and streamers were observed, the latter shooting up to a height of 25°; the general color was a faint yellowish light, but that of the dancers was a pale green. Woodstock, Vt., 19th. South Lee, Mass., 29th, p. m. Eastport, Me., 27th, 10 p. m. to midnight; extended from NW. to NE. and to an altitude of 15°; at 11 p. m. numerous beams appeared, all radiating from the same magnetic point, resembling rays of light from the sun, such as are sometimes seen after sunset; their color was a bright yellow. Newport, R. I., 3d, 7 to 9 p. m. Toronto, 20th, 26th. Alpena, 20th, 8.40 p. m., faint yellow light, with an occasional streamer; ended at 1 a. m. of 21st. Marquette, 20th, 9.50 p. m.; very brilliant at 10.40 p. m., when beams began to shoot up to a height of 30°; the entire northern heavens was illuminated; disappeared at 11.40 p. m. Escanaba, 8th, 9.15 to 9.35 p. m., a few streamers pointing toward zenith; 20th, 10.05 to 11.30 p. m., consisting of beams of pale yellow, having a wavy motion from E. to W. Ft. Snelling, Minn., 31st, 5 a. m. St. Vincent, Minn., 19th, 9 p. m., low down in the north; was bright, sending up many streamers until midnight; 20th, from 8 to 10 p. m., consisting of an arch of about 15° in height, with dark segment; a few streamers and folds; 27th, from 8 to 10 p. m., about 20° in height; was partially obscured. Riley, Ill., 21st, a mere northern twilight; altitude about 12°. Keokuk, 12th, aurora probable; clouds unusually bright in the northern sky from an altitude of 8° to zenith; earth currents interrupted telegraphic communication. New Corydon, Ind., 19th, 2 a. m., strong auroral light; 22d, 2 a. m., strong auroral light.

Atmospheric Electricity Interfering with Telegraphic Communication.—Silver City, N. M., 3d; Stockton, Tex., 12th, 16th, 17th.

Zodiacal Light.—Monticello, Ia., 25th; Des Moines, Ia., 4th; Cambridge, Mass., suspected, 11th, 14th, 26th; Nashville, Tenn., 1st, 2nd, 3rd. New Corydon, Ind., 20th to 23d, 25th to 27th.

OPTICAL PHENOMENA.

Lunar halos have been observed in the various districts on the following dates: New England, 3d, 5th, 6th, 7th, 28th, 30th, 31st; Middle Atlantic states, 2d, 3d, 6th, 7th, 9th, 12th, 28th; South Atlantic states, 2d, 6th, 7th, 9th, 29th, 30th; East Gulf states, 2d, 7th, 8th; West Gulf states, 2d, 3d, 4th, 10th, 28th to 31st; Rio Grande valley, 3d, 5th, 6th, 27th; Ohio valley and Tennessee, 2d, 3d, 7th, 8th, 9th, 11th, 17th, 22d, 27th, 29th, 30th; Lower Lake region, 6th, 7th, 11th, 12th, 28th, 30th, 31st; Upper Lake region, 5th to 11th, 30th, 31st; extreme Northwest, 2d, 9th; Upper Mississippi valley, 2d, 3d, 6th, 8th, 9th, 29th to 31st; Missouri valley, 2d, 3d, 4th, 6th, 12th, 29th, 31st; Northern Slope, 6th, 15th, 28th, 30th; Middle Slope, 1st, 6th, 8th; Southern Plateau, 2d, 27th to 30th; Middle Plateau, 6th, 28th; Northern Plateau, 7th, 8th, 31st; North Pacific region, 14th; Middle Pacific region, 11th, 18th, 28th; South Pacific region, 2d.

Solar halos have been observed in the various districts on the following dates: New England, 2d, 9th, 12th, 19th, 20th, 22d, 23d, 28th, 30th; Middle Atlantic states, 14th, 15th, 16th, 19th, 28th; South Atlantic states, 8th, 23d, 27th; East Gulf states, 1st, 21st, 30th; West Gulf states, 21st, 29th; Ohio valley and Tennessee, 6th, 7th, 11th, 17th, 19th, 21st to 23d, 27th to 29th; Lower Lake region, 6th, 11th, 17th, 19th, 23d, 27th, 28th, 30th, 31st; Upper Lake region, 11th, 27th; extreme Northwest, 1st; Upper Mississippi valley, 1st, 5th, 7th, 11th, 20th, 21st; Missouri valley, 26th; Middle Slope, 6th, 18th, 26th, 30th; Northern Plateau, 8th, 14th, 26th, 27th; Southern Plateau, 25th; Middle Pacific coast region, 11th, 17th, 30th.

Mirage.—Indianola, 19th, 20th; New Haven, 28th, 7 a. m.

MISCELLANEOUS PHENOMENA.

Earthquakes.—In the mining district of Taversal, Nottinghamshire, England, August, 1881, violent shock in one of the pits of the Stanton Iron Works Co., having a depth of 1290 feet. The miners were so alarmed at the accompanying noise that they rushed to the mouth of the pit, thinking that an explosion had occurred. In Pear Tree Inn, Fackley, bricks were removed from the chimney; the same thing occurred in a house at Taversal. At the latter village, the station master, while sitting in his house was thrown from his chair by the shock and a quantity of plastering was detached from the ceiling. There was no explosion in the mines or the occurrence of other ordinary circumstances to account for the phenomenon, but the cause as supposed was clearly indicated by the upheaval of the floor of one of the pits, showing that the seat of the disturbance was below the workings of the mine. This observation would appear to refute the general impression that earthquake shocks are seldom if ever felt at any great depth beneath the surface, as in deep mines. Hawaiian Islands, September 13th, 1881, island of Maui visited by very violent shocks. Constantinople, September, 1881, heavy shocks at Gallipoli and Adrianople during latter part of month. Chaugeri, Province of Anatolia, Turkey, September 30th, 1881, heavy shock, 11 persons killed; the grand mosque and many dwellings greatly damaged. The following observations were made on the Island of Ukamok, Alaska Territory, (55°, 48' N., 155°, 34' W.,) by Mr. Alexander Newlander, who resided there during the year ending June 30th, 1881: "September 28th, 1880, 6 p. m., three very heavy and successive shocks, direction of first shock N. to S., the remaining two from W. to E.; 9 p. m., severe shock from W. to E. 29th, 3 a. m., very heavy shock from W. to E.; 1 p. m., extremely heavy shock from W. to E. From the commencement of this phenomenon, September 28th, 1880, until its subsidence October 16th, 1880, there was an uninterrupted trembling motion of the earth interspersed with heavy subterranean rumbling sounds. During a short trip over a portion of the Island on September 29th, deep fissures with a width of from 15 to 20 inches were found to be very numerous. The residence of Mr. Newlander, one story high and substantially built of logs, was situated about 500 yards from shore, on rising ground and about 20 feet above sea-level. During the heavy shocks shelves were wrenched from the walls, a brick stove upset, the flooring twisted out of shape and heavy beef and flour barrels (full) were pitched from one side of the room to the other. Outside of the building no one was able to stand on their feet owing to a violent, jerky and rotary motion of the earth, which continued for at least 20 minutes. The action upon bodies of water is given as follows: Several times at low water the sea rose in a body, travelling inshore about 60 yards when it would subside, immediately followed by a succession of similar waves. The water in the creeks overflowed their banks to the eastward as indicated by the condition of the ground on that side which was dotted by numerous small pools of water, some of which were fully 40 yards distant from the east bank. On the south side of the Island a small shallow creek, across which one could have easily stepped previous to the earthquake, was now widened about six feet; the fresh water was changed to salt water, and the depth so increased, that the bottom was not discernable. After the shocks, heavy breakers were observed on the southwest shore of the Island, where, for the past four years, no such phenomenon has been observed. On the west side of the Island, the tide does not rise as high as before the shocks. The wind during the shocks was invariably from the WNW., and whenever it changed to easterly no shocks were experienced, and the trembling of the earth would diminish considerably." Nickerie, Dutch Guiana, June 20th, 1881, 11 a. m., two successive shocks, one immediately following the other, and each lasting about ten seconds; the second was slightly longer in duration and stronger than the first. The shocks were preceded, accompanied and followed by a dull, rumbling noise, resembling that of distant carriage wheels. The sensations to a person seated in a chair were as if some one was shaking the floor on which the chair stood, by a rapid to and-fro movement of the arms. A peculiar feeling of nausea was experienced for about a minute after the shocks. The air was very warm and oppressive, and the barometer stood at 30.21, the thermometer at 86°; sea very calm; slight breeze from the east. Bristol, N. H., October 6th, 1881, heavy shock 1 title after midnight, direction west to east; noise like the rumbling of a heavy train of cars; buildings jarred perceptibly. Kamouraska, Province of Quebec, 5th, severe shock. Concord, N. H., 6th, heavy shock about midnight; at Tilton it jarred houses and rattled dishes. Ashland, N. H., 6th, slight shock about midnight, lasting a few seconds. Virginia City, Nev., 21st, 7 p. m., two shocks, quite heavy, each lasting about two seconds; direction southwest